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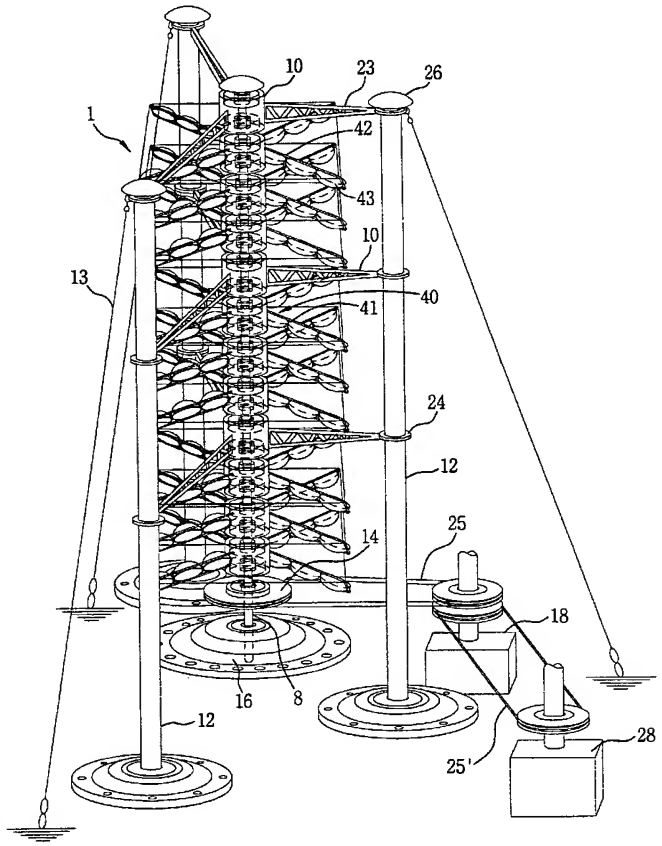

(57) Abstract: A magnetic levitated electric power generating apparatus using wind force and magnetic levitating force including windmill blades having permanent magnet which are rotated in a levitated state by repulsive force of the magnets. The apparatus includes an axis holder, a center axis upwardly and vertically provided on the support member, a plurality of windmill blade assemblies successively inserted to the center axis in an axial direction and having permanent magnets provided on the upper surface and lower surface thereof in order to give repulsive forces respectively to the surfaces which are correspondingly positioned in axial direction, a fly wheel positioned between the axis holder and the windmill blade assembly located lowest portion, and inserted to the center axis, a generator provided on the side portion of the flywheel and to which the rotation force is transmitted from the flywheel by belt or chain.

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MAGNETIC LEVITATED ELECTRIC POWER GENERATING APPARATUS USING WIND FORCE

TECHNICAL FIELD

The present invention relates to a magnetic levitated electric power generating apparatus using wind force, specifically, to an apparatus for generating power by making a windmill blades assembly rotate in levitated state by repulsive force of a plurality of permanent magnets.

BACKGROUND ART

A wind power generating method is considered as a method which can supply the non-polluted and low cost environmental energy, and can satisfy the energy demands that will increase continually in the future as the human being lives.

Moreover, many countries are trying to develop a new method for electric power generating apparatus using wind power, which has advantages of low cost, high efficiency, and high stability as a way of obtaining energy source of the next generation.

However, the method generally used for electric power generation using wind force is propeller single-axis generating apparatus, which can generate electric power by using the wind force blowing on a certain point at a certain altitude. Therefore, the efficiency of the apparatus is lowered by the low utility rate of the wind force, so that there are many difficulties to use in common.

DETAILED DESCRIPTION OF THE INVENTION

Therefore, the object of the present invention is to provide a magnetic levitated electric power generating apparatus using wind force, which can be installed any place where the wind can be used, for example, a mountain, the seaside, the desert, the slope, and the waterside, regardless of the direction and amount of the wind, and can increase the using efficiency of the wind.

The other object of the present invention is to provide a magnetic levitated electric power generating apparatus using wind force, which reduces friction resistance, maximizes utility rate of the wind, and increases productibility of generating electric power by rotating respective windmill blade assemblies as levitated state and transmitting the rotating force to a fly wheel.

Another object of the present invention is to provide a magnetic levitated electric power generating apparatus using wind force, which is increased its stability by coupling a triangle, square, or polygonal tie rod, assistant steel wire, or anchor rope to the windmill so as to cope with disasters like typhoon.

To achieve these objects of the present invention, the apparatus according to the present invention comprises an axis support member; a center axis upwardly and vertically coupled to the support member; a plurality of windmill blade assemblies of cylinder shape successively inserted to the center axis in an axial direction and having permanent magnets provided on the upper surface and lower surface thereof in order to give repulsive forces respectively to the surfaces which are correspondingly positioned in axial

direction; a flywheel positioned between the axial support member and the windmill blade assembly located lowest position, and inserted to the center axis; and a generator provided on the side portion of the flywheel and to which the rotation force is transmitted from the flywheel by belt or chain.

In addition, the apparatus according to the present invention comprises a plurality of axis support members; a plurality of center axes vertically coupled to the plurality of axis support members respectively so as to be rotational; a plurality of windmill blade assemblies of cylinder shape successively inserted to the plurality of center axis in an axial direction and having permanent magnets provided on the upper surface and lower surface thereof in order to give repulsive forces respectively to the surfaces which are correspondingly positioned in axial direction; a plurality of flywheels positioned between the plurality of axial support members and the windmill blade assemblies located lowest position, and inserted to the plurality of center axes respectively; and generators provided on the side portion of the respective flywheels and to which the rotation force is transmitted from the corresponding flywheel by belt or chain.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a magnetic levitated electric power generating apparatus using wind force in a first embodiment in accordance with the present invention;

Figure 2 is an enlarged perspective view showing the coupling relationship between a rotating axis support member and a center axis of the

apparatus in the first embodiment in accordance with the present invention;

Figure 3 is an exploded perspective view illustrating a windmill blade assembly composing the apparatus in the first embodiment according to the present invention;

Figure 4 is an exploded perspective view illustrating a bolster composing the apparatus in accordance with the second embodiment of the present invention;

Figure 5 is a perspective view showing a magnetic levitated electric power generating apparatus using wind force in the second embodiment according to the present invention;

Figure 6 is an enlarged perspective view showing a windmill blade assembly and driving connecting apparatus of the apparatus according to the second embodiment of the present invention;

Figure 7 is a perspective view of a magnetic levitated electric power generating apparatus using wind force according to a third embodiment of the present invention;

Figure 8 is an exploded perspective view showing a forward rotating windmill blade assembly according to the third embodiment of the present invention;

Figure 9 is an exploded perspective view showing a reverse rotating windmill blade assembly according to the third embodiment of the present invention; and

Figure 10 is a perspective view showing an example of tie rod having frustum shape composing the apparatus according to the present invention.

MODE FOR CARRYING OUT THE PREFERRED EMBODIMENTS

The present invention will now be described with reference to embodiments shown in accompanying drawings.

As shown in figure 1, in a magnetic levitated electric generating apparatus using wind force simultaneously driving the center rotating axis according to first embodiment of the present invention, a center rotating axis 8 is coupled so as to rotational to the vertical direction from upper middle part of a rotating axis holder 16.

At that time, as shown in figure 2, a permanent magnet 19 is disposed between the rotating axis holder 16 and periphery of the center rotating axis 8, and a roller bearing 30 is coupled between the center rotating axis 8 and the permanent magnet 19 so that the center rotating axis 8 is able to rotate.

In addition, as shown in figure 1 and figure 3, a plurality of windmill blade assemblies 40 is successively inserted in an axial direction of the center rotating axis 8, in the state of the center rotating axis 8 being coupled to a hollowed unit 41a of hub 41 in the windmill blade assembly 40.

In the respective hollowed unit 41a of the hub 41, a key recess unit 41c is formed for inserting a radial asperity unit 8a formed at a predetermined interval in axial direction into corresponding periphery of the center rotating axis 8.

Herein, when the center rotating axis 8 is coupled to the key recess unit 41c of the hub 41, vertical fluidity should be attained (magnetic clearance more than 3mm~10mm).

Non-magnetic material (stainless, aluminum, copper alloy, etc.) is used to make the respective windmill blade assemblies 40 is, the shape of the windmill blade assemblies 40, as shown in figure 3, an intrusion 41b is formed in upper and lower part of the cylinder except the periphery at a certain thickness depressed to inside of the cylinder at a predetermined depth. In this intrusion 41b, respective permanent magnets 19 having a ring shape and same height as that of the intrusion 41b is coupled.

And, a plurality of arms 42 is coupled and fixed in outer radial direction of side periphery part of the respective hub 41 at a certain interval, and a plurality of wing members 43 having empty hemisphere shape is successively provided inside of the arm 42. The arm 42 rotates toward only one direction by the wind because of distribution of the wing members 43, between an end of an arm 42 and an end of the other arm 42, a connecting member 32 more than one is installed at horizontal direction and support the arms.

The windmill blade assemblies 40 disposed like above mentioned are positioned apart from each other at a certain distance in axial direction of the center rotating axis 8, because permanent magnets 19 are disposed so that the surfaces facing each other in axial direction have repulsive force against each other.

On the other hand, as shown in figure 1, in some places among the windmill blade assemblies 40 disposed as stacking (that is, not every interval among the assemblies), a bolster 10 is inserted by the center rotating axis 8.

Herein, the interval between the windmill blade assemblies 40 and the interval between the windmill blade assembly 40 and the bolster 10 are

identical.

Because the bolster 10 has similar shape with that of the windmill blade assemblies 40, only the different points from the assembly 40 will be described. As shown in figure 4, in a hollowed unit 10a' of a bolster hub 10a, a key recess unit is not installed, and a roller bearing 22 is installed between positions on which the hollowed unit 10a' and center rotating axis 8 correspond, so that the center rotating axis 8 can rotate smoothly.

In addition, a plurality of holding arms 23 is coupled to the one side periphery of the bolster 10 to the radial direction with a certain interval, and a fixed part 24 is installed on the end of the holding arms 23. And the fixed parts are inserted and fixed on corresponding tie rods 12, which are fixed on the ground as the number corresponding with that of the fixed parts 24.

The upper end part of a plurality of tie rods 12 is connected to one end of an anchor rope 13, and the other end of the anchor rope 13 is fixed on the ground.

Unexplained reference numeral 26 is an upper part of tie rod fixing means covering the upper end part of the tie rod 12.

On the other hand, a flywheel is coupled and fixed between the rotating axis holder 16 and windmill blade assembly 40 located on lowest part among those assemblies 40. In one side of the flywheel, a transmission 18 being transmitted the rotation force from the flywheel through a driving force transmitting means, for example, a belt, a rope or a chain is installed, and one side portion of the transmission 18, a generator 28 for generating the electric power by being transmitted the rotation force from the transmission through

the belt or the chain 25'.

As described above, the first embodiment of the present invention is constructed as rotating the center rotating axis 8 and respective windmill blade assemblies 40 simultaneously.

Hereinafter, the second embodiment of the present invention will be described.

Explanations for same element with the first embodiment of the present invention are omitted and same reference numerals are used.

The second embodiment of the present invention is characterized by rotating the respective windmill blade assemblies while the axis does not rotate.

As shown in the figure 5, in the magnetic levitated electric power generating apparatus using wind force 101 of the second embodiment according to the present invention, a center fixing axis 108 is coupled and fixed to upward and vertical direction from the upper middle part of a fixing axis holder 116.

The upper end part of the center fixing axis 108 is coupled and fixed to a bolster 110.

Shape of the bolster 110 is similar to that of the bolster 10 in the first embodiment of the present invention, and a plurality of holding arms 110a are coupled to side periphery part of the bolster 110 to laterally radial direction at a certain interval. The end part of the holding arm 110a is fixed and coupled to the ground by a supplementary steel wire or an anchor rope (the number of the holding arms is four in this second embodiment).

In the center fixing axis 108 which is located between the fixing axis holder 116 and the bolster 110, a plurality of windmill blade assemblies 140, in which an up and down driving connecting apparatus 127 of hollow cylinder shape is formed, is inserted as coupling the center fixing axis 108 to the hollowed part 141a of the assembly. However, the windmill blade assembly 154 located on the highest part has lower driving connecting apparatus only.

As shown in figure 6, the upper part of the driving connecting apparatus 127 has convex shape and the lower part of the apparatus 127 has concave shape, thereby the windmill blade assemblies 140 located on upper and lower part are coupled together, and all the windmill blade assemblies 140 rotate altogether.

The material and shape of the respective windmill blade assembly 140 are same with those of the windmill blade assembly in the first embodiment of the present invention, so the explanations for that are omitted.

On the other hand, between the fixing axis holder 116 and the windmill blade assembly located on the lowest part among those assemblies, a flywheel 114 is formed and inserted into the center fixing axis 108. On one side part of the flywheel 114, a transmission 18 being transmitted the rotation force generated from the flywheel 114 through a belt or a chain 25 is installed. And on one side of the transmission 18, a generator 28 being transmitted the rotation force from the transmission 18 through a belt or a chain 25'.

The apparatus in the second embodiment explained above is a electric power generating apparatus using wind force, in which the flywheel 114 and the windmill blade assemblies 140 and 154 rotate centering around the center

fixing axis 108. The windmill blade assemblies 140 and 154 are coupled to each other by the driving connecting apparatus 127, but respective assemblies are under the repulsive force, so the assemblies are less effected by the rotation resistance.

According to that, the apparatus in the second embodiment of the present invention can be installed easily in indented places, for example, in mountains, seaside, and slopped ground, etc..

Among the unexplained reference numerals, 141 represents a hub, 142 is an arm, 143 is a hollowed hemisphere wing member, 132 is a connecting member, and 122 represents a roller bearing coupled between the center fixing axis 108 and the permanent magnet 19 in the windmill blade assemblies 140 and 154.

Hereinafter, the third embodiment of the magnetic levitated electric power generating apparatus using wind force according to the present invention will be described.

For some elements same with those of the first embodiment, same reference numerals are used and explanations are omitted.

The apparatus in the third embodiment is formed by connecting two apparatuses in the first embodiment parallelly. The two center rotating axis rotate simultaneously to the opposite direction with each other on receiving the wind force, and at the same time, the windmill blade assemblies adjoining parallelly each other rotate simultaneously to the same direction because of being connected by a belt or a rope. In addition, the windmill blade assemblies adjoining vertically each other rotate simultaneously to the

opposite direction with each other.

As shown in the figure 7, in a center rotating axis simultaneously driving magnetic levitated electric power generating apparatus 201, center rotating axes 208 and 208' are coupled to the upper middle part of the rotating axis holders 216, which is located neighboring each other, to upward and vertical direction so as to be rotational.

Hereinafter, the construction will be described making an apparatus between the two as an example.

As shown in the figure 8, on the center rotating axis 208, a plurality of forward rotating windmill blade assemblies 240 are inserted as the shape of being coupled the center rotating axis 208 to the hollowed part 241a of the assemblies.

And, as shown in the figure 9, reverse rotating windmill blade assemblies 250 are inserted between two forward rotating windmill blade assemblies 240 as the shape of being coupled the center rotating axis 208 to the hollowed part 251a of the assemblies.

Herein, in the plurality of forward rotating windmill blade assemblies 240, a key recess unit 241c for inserting a radial asperity unit 208a of the center rotating axis 208 to the hollowed parts 241a is formed, so the center rotating axis 208 is inserted into the key recess unit 241c. In the plurality of reverse rotating windmill blade assemblies 250, as shown in the figure 9, a roller bearing 222 is formed in respective hollowed parts 251a, thereby the center rotating axis 208 is inserted into the roller bearing 222.

When the center rotating axis 208 is coupled to the key recess unit

241c of the windmill blade assembly 240, the vertical fluidity (magnetic levitation clearance larger than 3mm~10mm) should be guaranteed.

As described above, from the rotating axis holder 216 to upward direction, apparatuses are installed as flywheel 214, forward rotating windmill 240, reverse rotating windmill 250, forward rotating windmill 240, reverse rotating windmill 250...order (in the other embodiment of the present invention, the installation order might be as flywheel 214, reverse rotating windmill 250, forward rotating windmill 240...). In detail, the windmill blade assembly 240, in which the key recess unit 241c is installed, located in the first center rotating axis 208 side and the windmill blade assembly 240, in which the bearing is installed, located in the second center rotating axis 208' side are connected to each other by a belt or a chain 25.

Likewise, the windmill blade assembly 250, in which the bearing 222 is installed, located in the first center rotating axis 208 and the windmill blade assembly, in which the key recess unit 241c is installed, located in the second center rotating axis 208' are connected by a belt or a chain 25.

Herein, the windmill blade assemblies 240 and 250 distributed like above are disposed at a certain interval in an axial direction, because the surfaces facing each other are distributed so as to have the repulsive force mutually.

Therefore, the frictional resistance between the windmill blade assembly located on the upper part and the windmill blade assembly located on the lower part is reduced, thereby the magnetic levitation force can be increased by the repulsive rotating force of the windmill. Between the rotating

axis holder 216 and the windmill blade assemblies 240 and 250 located lowest part among those assemblies, the flywheel 214 is installed. And on one side of the flywheel 214, a transmission 18 being transmitted the rotation force generated from the flywheel 214 through a belt or a chain 25 is installed. In addition, on one side of the transmission 18, a generator 28 being transmitted the rotating force from the transmission 18 through a belt of a chain 25'.

That is, the electric force productivity can be maximized by the wind force and the magnetic levitated repulsive rotating force.

The material used and the shape of the respective windmill blade assemblies 240 and 250 are same with those of the windmill blade assemblies in the first embodiment of the present invention, so the explanations are omitted.

On the other hand, on the lateral periphery of the hub 241 and 251 in the forward and reverse rotating windmill blade assemblies 240 and 250, a plurality of arms 242 and 252 are coupled at a certain interval to external radial direction. And inside the arms 242 and 252, a plurality of empty hemisphere wing members 243 and 253 are successively coupled. The hemisphere wing members of the forward and reverse rotating windmill blade assemblies 240 and 250 are disposed toward opposite direction so as to rotate to opposite direction mutually.

Therefore, the first and the second center rotating axis 208 and 208' are to be rotate to opposite direction.

In the third embodiment of the present invention, an end portion of an arm 242 or 252 and an end portion of the other arm 242 or 252 are supported

by the connecting member 232 more than one installed in horizontal direction. And the shape and installation of the bolster 10, tie rod 12 and the anchor rope 13 are same with that of the first embodiment of the present invention.

The magnetic levitated electric power generating apparatus using wind force according to the present invention can be installed as various shapes in accordance with the geographic characteristics (mountains, seaside, desert, slopped place, and waterside, etc.). That is, size of the wing can be controlled, and the shapes of the tie rod can be various shapes of triangle, square, pentagon, and trapezoid.

In the magnetic levitated electric power generating apparatus using wind force, in which the tie rod has trapezoidal shape, the length of the arm located on lowest part is the longest, and the length of the arm located on highest part is the shortest, as shown in the figure 10. Between them, the lengths of the arms are gradually shortened from lower part to upper part.

That is, in the electric force generating apparatus using wind force 301 shown in the figure 10, the size of arm located in place where wind blows strongly and the altitude is high, and the sizes of the arms are gradually enlarged toward the place where wind blows weakly and the altitude is low. Therefore, the stability of the apparatus is improved by assembling and installing the tie rods 312 of the bolster to be slopped.

The construction and operation of the electric power generating apparatus using wind force 301 shown in the figure 10 are similar to those of the apparatus in the first embodiment of the present invention, so the explanations for those are omitted.

Among unexplained reference numerals, 340 represents a windmill blade assembly, 341 represents a hub, 342 is an arm, 343 is a wing member, 308 is a center rotating axis, 314 is a flywheel, 316 is a rotating axis holder, 320 is a windmill wing, 323 is a supporting arm, and 324 represents a fixing flap, respectively.

Embodiments of the present invention constructed as above, when the rotation force of a plurality of windmill blade assemblies being rotated by the wind force is transmitted to the flywheel intensively, then the rotation force is transmitted to the transmission through the belt or the chain, and the transmitted rotation force is transferred to the generator, thereby electric power generating using wind force is performed.

INDUSTRIAL APPLICABILITY

As so far described, the magnetic levitated electric power generating apparatus using wind force according to the present invention, the respective windmill blade assemblies in which the permanent magnets are coupled and the flywheel rotate on the holder in magnetic levitated state, therefore, the frictional resistance can be reduced and the rotation force of the windmill can be increased.

In addition, utility rate of the wind force can be increased by transmitting the rotation force of the windmill blade assemblies intensified in the flywheel to the transmission through a belt or a chain.

Moreover, in order to deal with the natural disaster like typhoon, tie rods of triangle, square or polygon shape or anchor rope is installed around

the windmill, thereby the stability of the apparatus can be improved.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible. Therefore, it should be understood that the above-described embodiments are not limited by any of the details of the foregoing description, but rather should be construed broadly within its spirit and scope as defined in the appended claims.

CLAIMS

1. A magnetic levitated electric power generating apparatus using wind force comprising:

an axis holder;

a center axis coupled to upward direction of the axis holder vertically;

a plurality of windmill blade assemblies of hollow cylinder shape being stacked in axial direction and inserted into the center axis, wherein permanent magnets are coupled to the upper and lower surface so that the surfaces facing each other in axial direction have repulsive force mutually;

a flywheel being disposed between the axis holder and the windmill blade assembly located on the lowest part, and being coupled to the center axis; and

a generator installed on one side of the flywheel for receiving the rotation force from the flywheel through a belt or a chain.

2. The apparatus according to claim 1 further including a bolster or more than one disposed between the plurality of windmill blade assemblies, and coupled to the center axis.

3. The apparatus according to claim 1 further comprising a transmission disposed between the flywheel and the generator for transmitting the rotation force from the flywheel to the generator.

4. The apparatus according to claim 1, wherein the respective windmill

blade assembly includes:

a hub;

a plurality of arms fixed and coupled to the side periphery part of the hub to laterally radial direction at a predetermined interval; and

a plurality of empty hemisphere wing members coupled inside the arm.

5. The apparatus according to claim 1, wherein a permanent magnet of ring shape is coupled between the axis holder and the periphery part of the center axis, and a roller bearing is coupled between the center axis and the permanent magnet.

6. The apparatus according to claim 1, wherein a plurality of radial direction rotation units are formed in the periphery part of the center axis at a predetermined interval in axial direction, and a key recess unit is formed in the hollowed part of the respective windmill blade assembly for inserting the corresponding radial direction rotation unit into the hollowed part.

7. The apparatus according to claim 6, wherein the clearance between the key recess unit and the center axis is within 3mm~10mm.

8. The apparatus according to claim 4, wherein concave portions depressed to inside by a certain depth are formed on the upper and lower surfaces of the hub having cylinder shape, and the permanent magnets having

ring shape are coupled to the concave portions, respectively.

9. The apparatus according to claim 1, wherein the distances between the windmill blade assemblies are identical.

10. The apparatus according to claim 2, wherein the roller bearing is inserted between the hollowed part of the hub in the bolster and corresponding center axis.

11. The apparatus according to claim 2, wherein a plurality of supporting arms are fixed and coupled to the side periphery part of the hub in the bolster to laterally radial direction at a certain interval, and the end portions of the supporting arms are inserted into corresponding tie rods which are fixed on the ground.

12. The apparatus according to claim 4, wherein a connecting member or more installed to horizontal direction supports between end portions of neighboring arms.

13. The apparatus according to claim 4, wherein lengths of the plurality of arms are all identical with each other.

14. The apparatus according to claim 4, wherein the length of arm located on lowest part is the longest, the length of arm located on highest part is

shortest, and lengths of arms are gradually shortened from lower part to higher part.

15. The apparatus according to claim 1, wherein the center axis, in which a plurality of windmill blade assemblies are inserted, is coupled to the axis holder.

16. The apparatus according to claim 2, wherein a plurality of supporting arms are coupled on the periphery of the bolster, and the end portions of the respective supporting arms are coupled on the ground by a supporting steel wire or an anchor rope.

17. The apparatus according to claim 15, wherein a lower part driving connecting apparatus is formed on the plurality of the windmill blade assemblies.

18. The apparatus according to claim 17, wherein a higher part driving connecting apparatus is further formed on the plurality of the windmill blade assemblies.

19. The apparatus according to claim 17, wherein the lower part driving connecting apparatus has concave shape, so the windmill blade assembly located on lower part are coupled to that in respective position.

20. The apparatus according to claim 18, wherein the higher part driving connecting apparatus has convex shape, so the windmill blade assembly located on higher part are coupled to that in respective position.

21. The apparatus according to claim 1, wherein material used for windmill blade assemblies is non-magnetic material.

22. A magnetic levitated electric power generating apparatus using wind force comprising:

a plurality of axis holders;

a plurality of center axis coupled to plurality of axis holders in vertical direction so as to be rotational;

a plurality of windmill blade assemblies of hollow cylinder shape inserted into the plurality of center axes in axial direction as stacked, and being coupled permanent magnet on upper and lower surfaces so that the surfaces facing each other have repulsive force;

a plurality of flywheels located between the plurality of axis holders and the windmill blade assembly disposed on the lowest part, and inserted into the plurality of center axes respectively; and

generators located on one side parts of the respective flywheels and receiving the rotation force from the corresponding flywheels through a belt or a chain.

23. The apparatus according to claim 22 further comprising a bolster or more, located between the windmill blade assemblies, and inserted into the center axes respectively.

24. The apparatus according to claim 22 further comprising transmissions located between the flywheels and the generators for transferring the rotation force received from the flywheels to the generators.

25. The apparatus according to claim 22, wherein the respective windmill blade assembly comprises:

a hub;

a plurality of arms fixed and coupled on the side periphery part of the hub to laterally radial direction at a certain interval; and

a plurality of empty hemisphere wing members coupled inside of the arm.

26. The apparatus according to claim 22, wherein a permanent magnet having ring shape is coupled between the plurality of the axis holders and periphery of the corresponding center axis, and a roller bearing is coupled between the center axis and the permanent magnet.

27. The apparatus according to claim 22, wherein the windmill blade assemblies located horizontally are connected by a belt or a rope respectively and rotated toward the same direction, the windmill blade assemblies located vertically

are rotated to opposite direction with each other, and the center axes are rotated simultaneously to opposite direction with each other.

28. The apparatus according to claim 22, wherein the windmill blade assemblies inserted into the respective center axis in axial direction are composed of forward rotating windmill blade assemblies and the reverse rotating assemblies inserted one after another.

29. The apparatus according to claim 28, wherein a plurality of radial direction rotation units are formed on the periphery part of the center axis in axial direction at a certain interval, and a key recess unit for inserting the radial direction rotation unit into the hollowed unit is formed on the plurality of forward rotating windmill blade assemblies.

30. The apparatus according to claim 28, wherein the reverse rotating windmill blade assemblies includes the roller bearing formed on the hollowed unit, in which the center axis is disposed as inserted form.

31. The apparatus according to claim 28, wherein the clearance between the key recess unit in the forward rotating windmill blade assemblies and the center axis is within 3mm ~10mm.

32. The apparatus according to claim 28, wherein the wing members

formed in forward and reverse rotating windmill blade assemblies are disposed toward the opposite direction with each other.

33. The apparatus according to claim 22, wherein the intervals between the windmill blade assemblies are identical with each other.

34. The apparatus according to claim 23, wherein the roller bearing is disposed between the hollowed unit in the bolster body and the corresponding center axis.

35. The apparatus according to claim 23, wherein a plurality of supporting arms are fixed and coupled to the side periphery part of the bolster body to external radial direction at a certain interval, and the end portions of the supporting arms are inserted and fixed into a plurality of tie rods which are fixed into the ground, respectively.

36. The apparatus according to claim 25, wherein between the end portion of an arm and the end portion of the neighboring arm is supported by the connecting member installed more than one in horizontal direction.

37. The apparatus according to claim 22, wherein the windmill blade assemblies are made of non-magnetic material.

FIG. 1

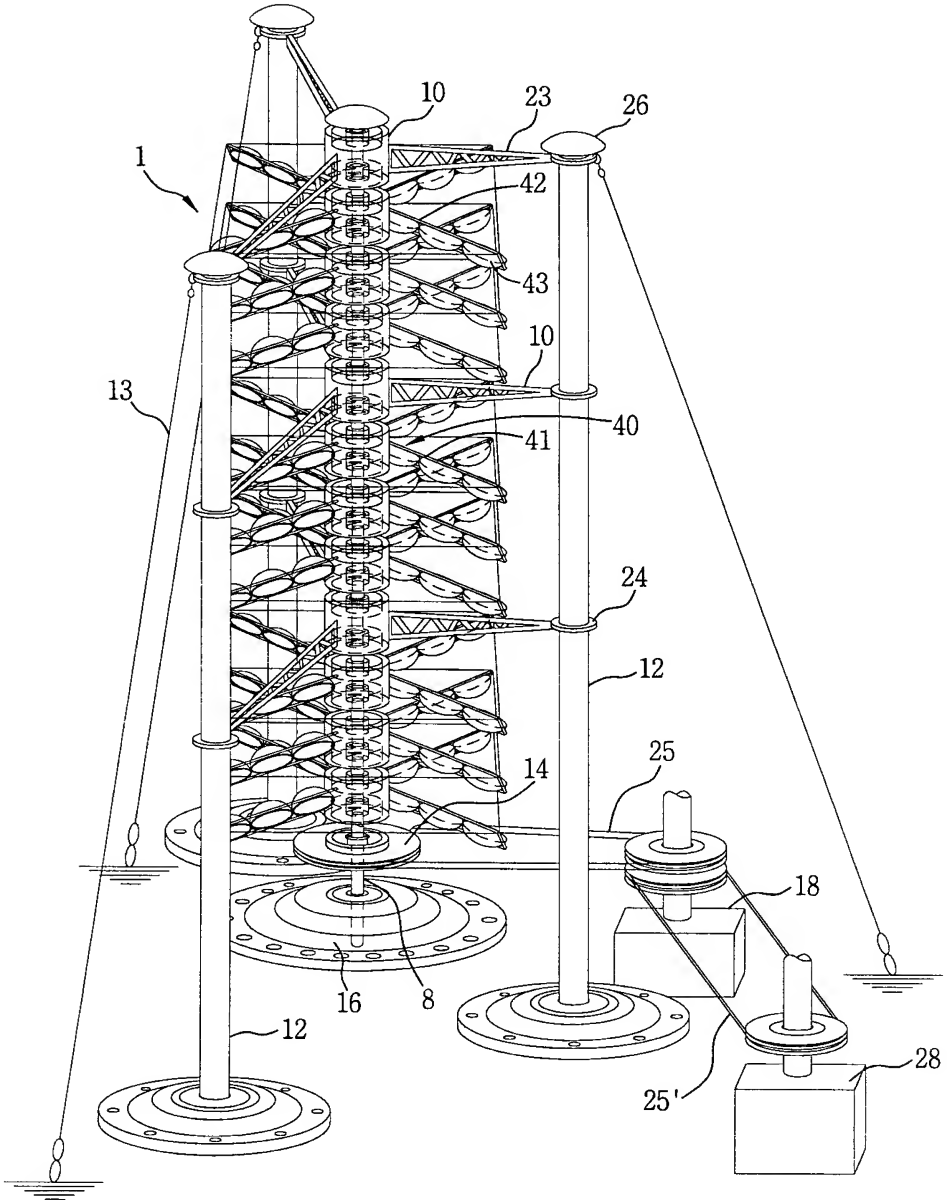


FIG.2

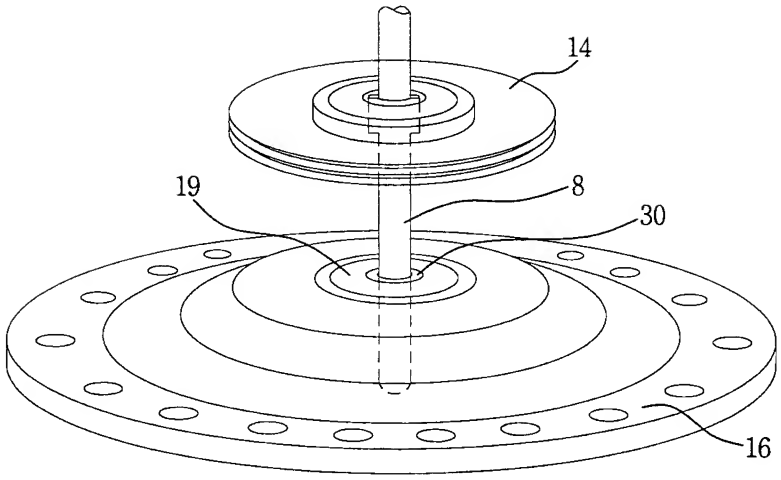


FIG.3

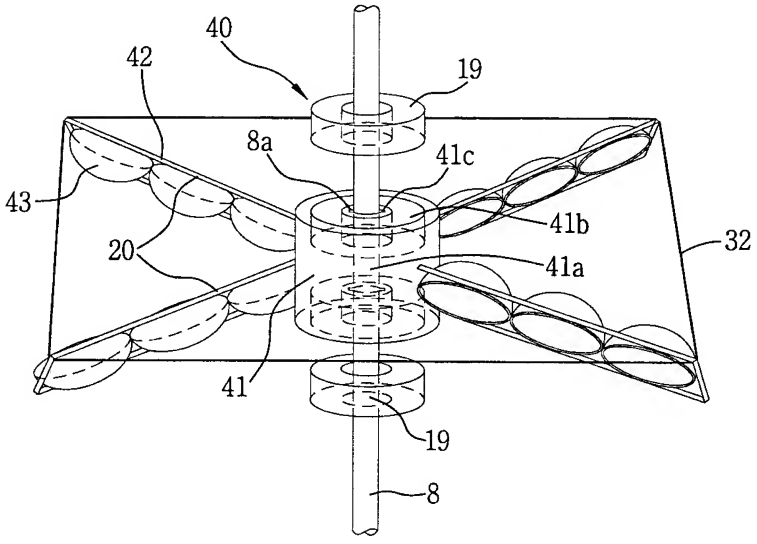


FIG.4

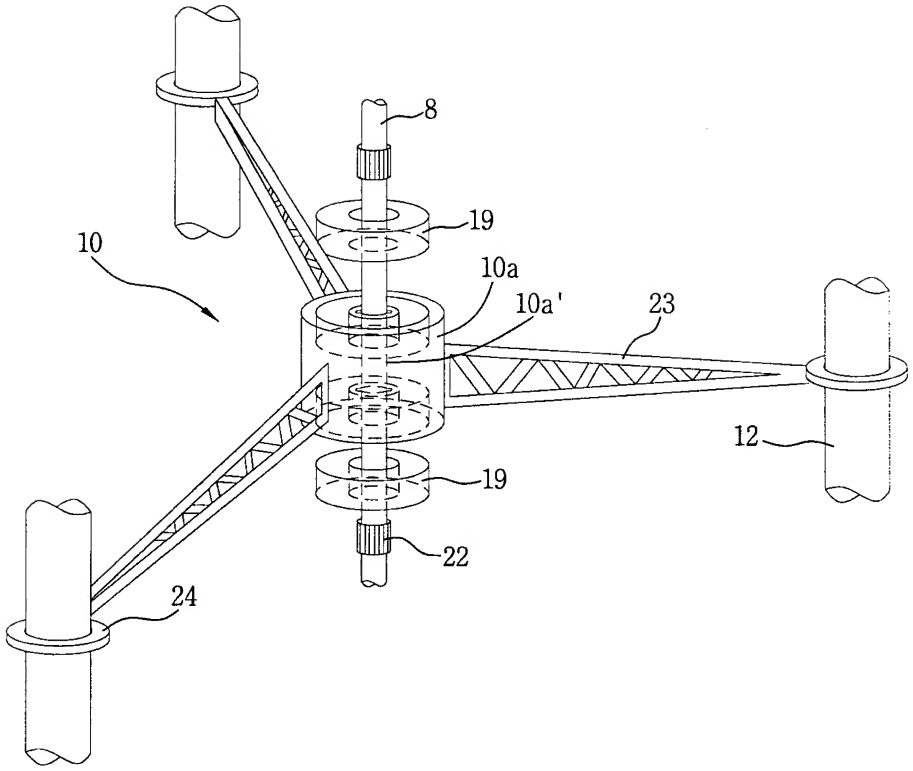


FIG.5

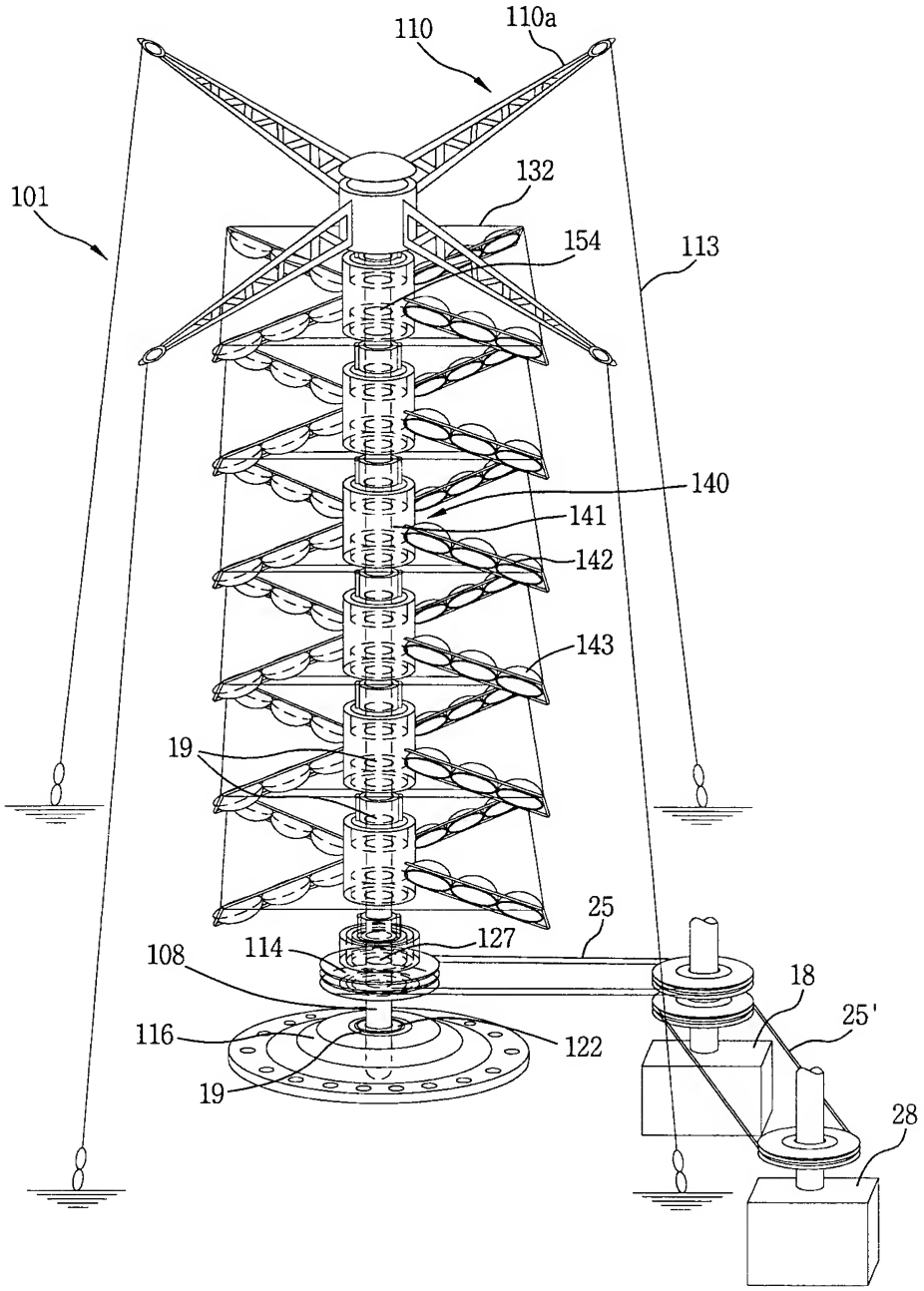

110
110a
101
132
154
113
140
141
142
143
19
25
127
114
108
18
25'
116
122
19
28

FIG.6

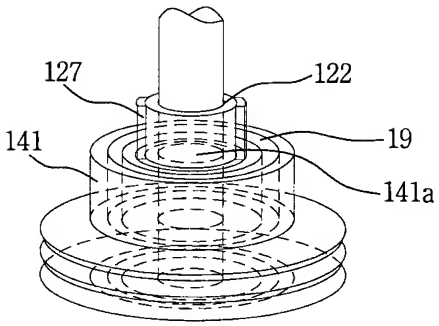
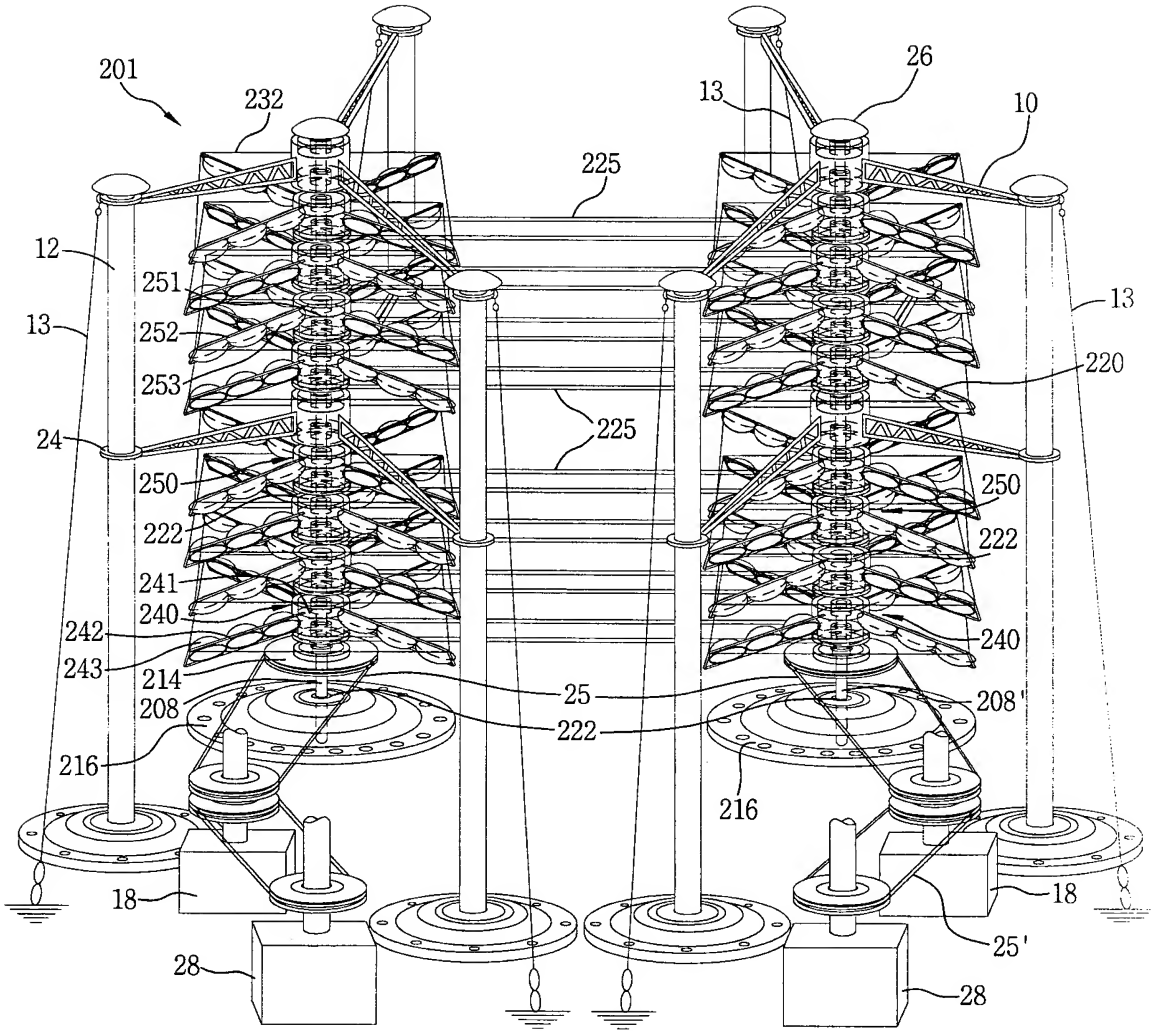


FIG.7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232
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13
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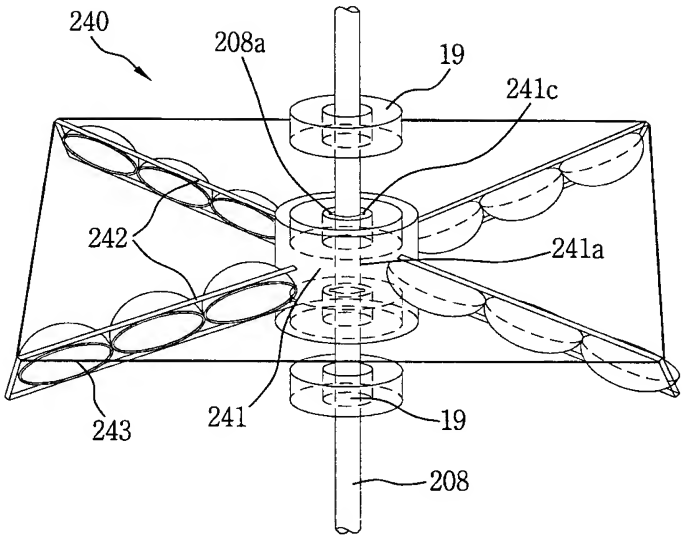
253
24
250
222
241
240
242
243
214
208
216
18
28
13
26
10
13
220
225
250
222
240
25
208'
222
216
18
25'
28

FIG.8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208a
19
241c
242
241a
243
241
19
208

FIG.9

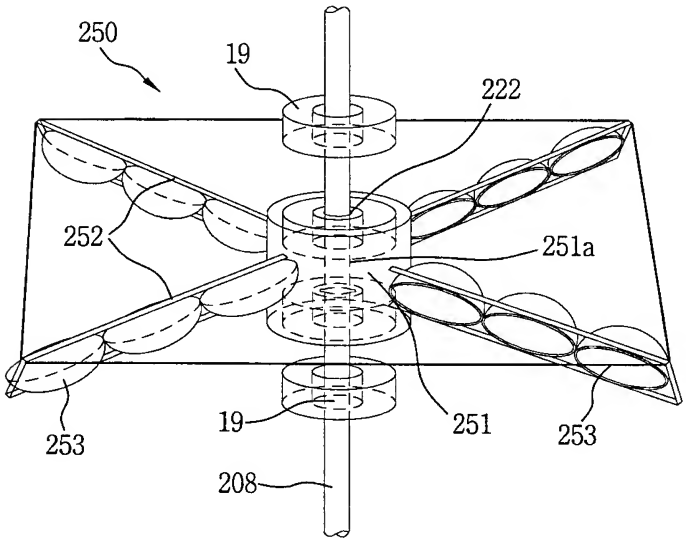
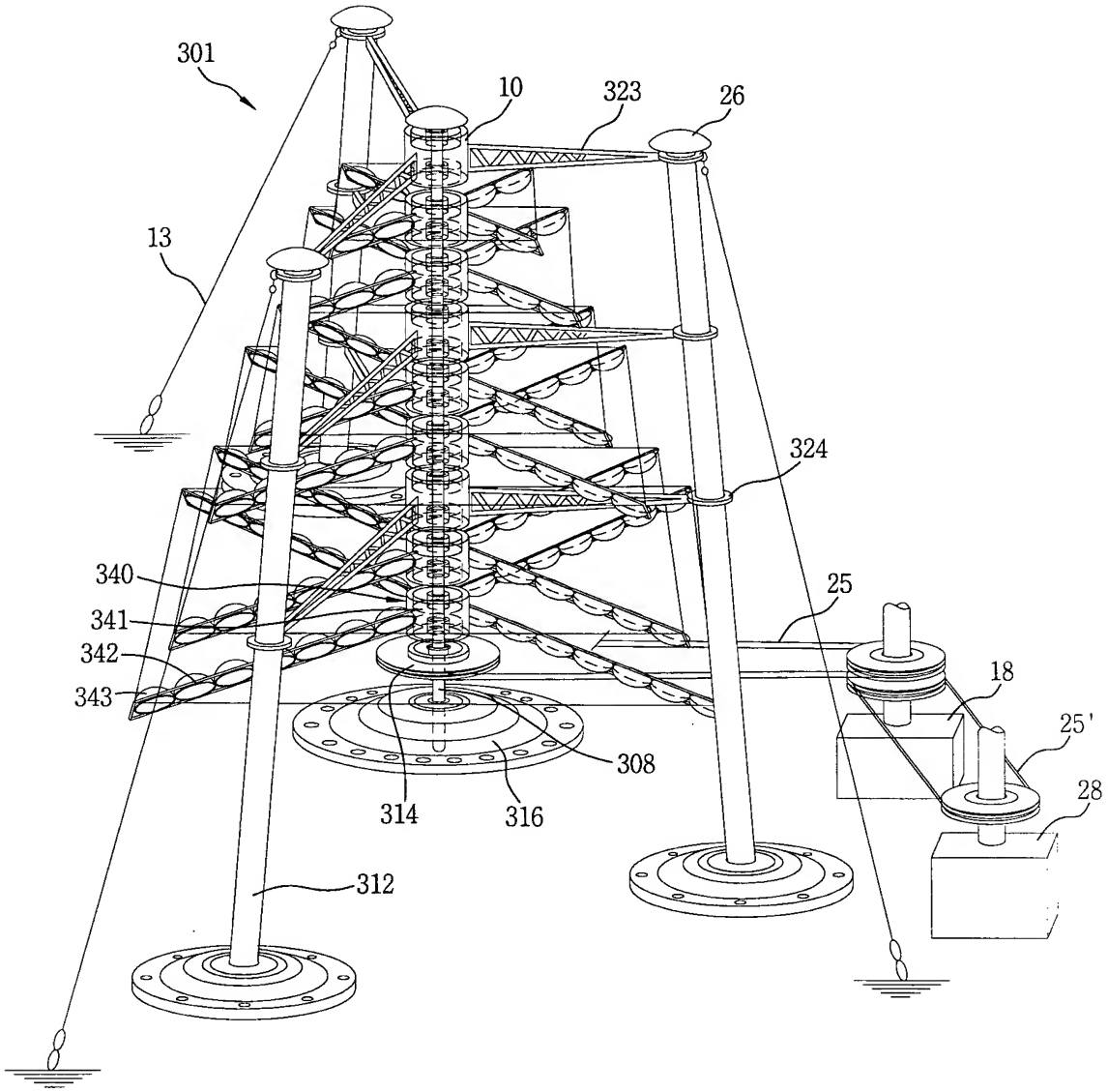

250
19
222
252
251a
253
19
251
253
208

FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/01478

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 F03D 11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimun documentation searched (classification system followed by classification symbols)
IPC7 F03D 11/00

Documentation searched other than minimun documentation to the extent that such documents are included in the fileds searched
Korean Patents and applications for inventions since 1975. Korean Utility models and applications for Utility models since 1975. Japanese Utility models and applications for Utility models since 1975.

Electronic data base consulted during the intertnational search (name of data base and. where practicable. search trerms used)
NPS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document. with indication. where appropriate. of the relevant passages	Relevant to claim No.
A	JP 10-159707 A(Nippon Seico. KK) 16 June 1998 see the whole document.	1-37
A	JP 08-4647 A(Sato Ryoda) 9 January 1996 see the whole document.	1-37
A	DE 19502428 A(Gehra Ludwig) 1 August 1996 see the whole document.	1-37

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 MARCH 2001 (29.03.2001)	30 MARCH 2001 (30.03.2001)

Name and mailing address of the ISA/KR	Authorized officer
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